

NASA General Aviation Research National General Aviation Roadmap Small Aircraft Transportation System

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ATCA SATS.ppt: 3/2/00



Outline



The Golden Rule of the information age is "Time is the Scarce Commodity."

Early in the 21st century, the demand for personal transportation will soar beyond supply.

The Millennial Opportunity: SATS creates more time for more people.

SATS Concept
States-Driven Industry Opportunities
National Strategies

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Solving 21st Century Transportation Challenges







The Small Aircraft Transportation System is a safe travel alternative, freeing people and products from transportation delays, by creating access to more communities in less time.



The Next Generation Cockpits and Aircraft







Lancair Columbia 300



21st Century Propulsion



and Others....

Coming Soon to an airport near you!

ATCA_SATS.ppt: 3/2/00

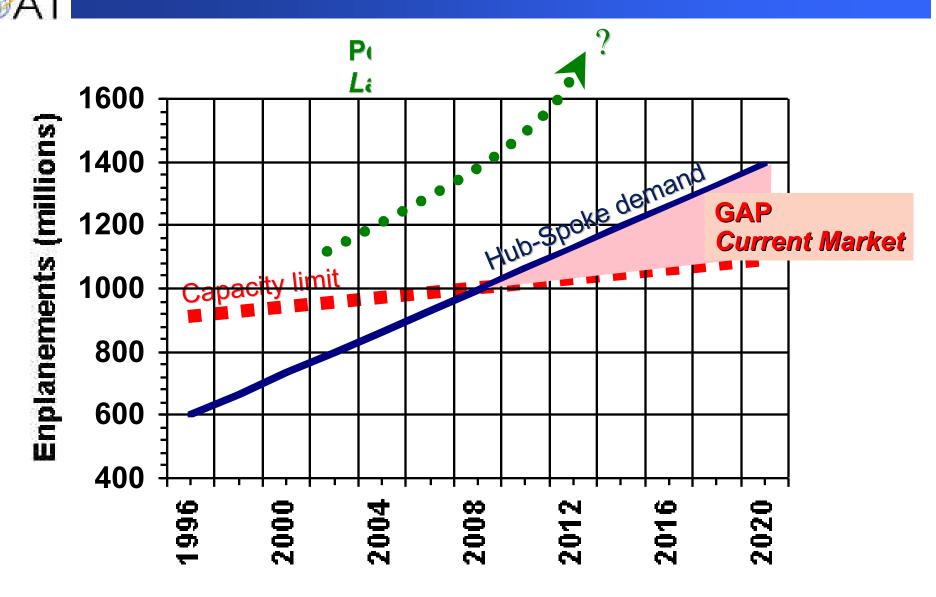
Figure 4



Demand Will Soon Exceed Supply



...not even considering pent-up travel demand...



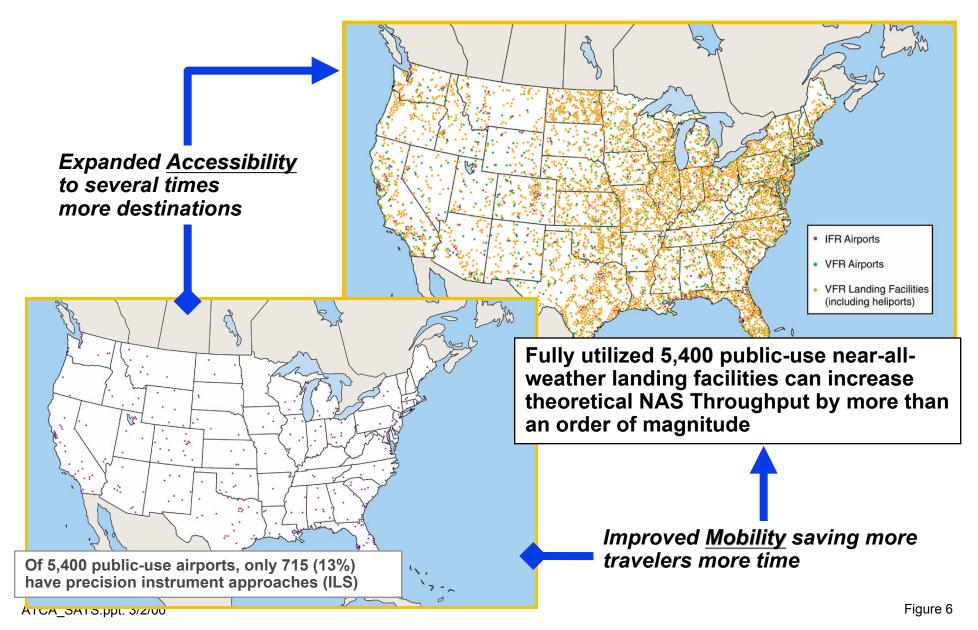


SATS Increases Accessibility and Mobility

SATS

("...creating access to more communities in less time...")



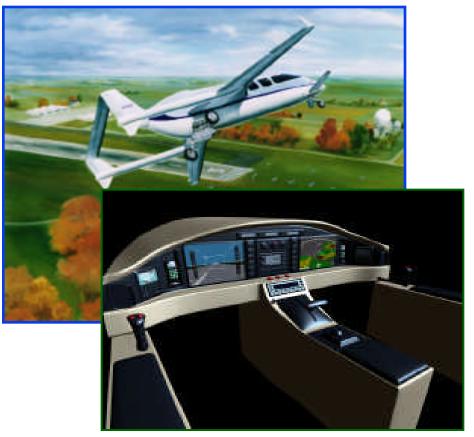




Precision Guidance to Every Runway End in America



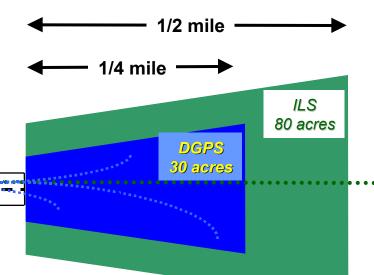




Highway in the Sky / Synthetic Vision with "Virtual" Approach Procedures:

- Saves land
- Limits noise
- Increases safety

Runway Protection Zone (RPZ)



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Digital Airspace Infrastructure





A client-server-based architecture will provide information services on an "Airborne Internet" to support collaborative air traffic management. Aircraft and landing facilities will be interconnected nodes in a high-speed digital communications network providing instant identification and information services on demand with seamless linking to the global transportation system.

"Smart Landing Facilities" will provide automation-enabled separation and sequencing in non-towered, non-radar, non-hub terminal airspace.



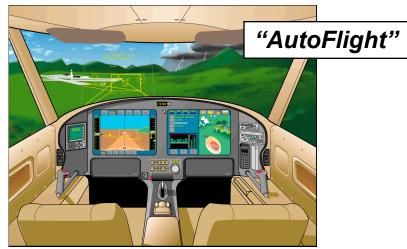
"Simultaneous Non-Interfering Operations" will enable hub & spoke airport throughput to be increased developing the infrastructure capability to use stub runways, taxiways, & vertiports instead of conventional runway under adverse weather conditions.



SATS Air Vehicle Enabling Technologies













Cyber-Training



Virginia SATSLab



Chester

Wilmington



Datalink Infrastructure Facility (DIF) Stations

- Comm: VDL Airborne Information e-Services
- Nav: LAAS/DGPS Broadcast Nav
- Surveillance: ADS
- ATM Station



Hagerstown

Baltimore

- Highway in the Sky (HITS) Precision Guidance to All Runway Ends
- Satellite-based Airborne Internet, Client-Server architecture
- VFR 20:1 Approach Zones in IMC using "Virtual" TerPs
- Towerless, Radarless Operations with self-sequencing & separation



SATSLab Demonstration Scenarios "Prove SATS Works"





20:1 RPZ Approaches

 Prove that HITS integrated with Synthetic Vision will safely support use of VFR (20:1) Runway Protection Zones and approach patterns in IMC, with potential application to virtually all runway ends and helipads in the nation.



Simultaneous Non-Interfering Operations

 Prove that SATS technologies enable RIA, General Aviation, and commuter aircraft to operate at Hub or Spoke facilities in Class B airspace with potential for increased throughput.



SATS EnRoute

 Prove that SATS operating capabilities enable free flight in non-radar surveilled airspace.





SATSLab Demonstration 20:1 RPZ Scenario Design Questions







20:1 RPZ Approaches

- What approach and landing minima apply when using synthetic vision with Highway in the Sky operations?
- What lighting requirements apply when using synthetic vision with Highway in the Sky operations?
- How many aircraft can simultaneously operate in a non-towered, nonradar airspace?
- Under what conditions can Terminal Procedures (TerPs) be "virtual" (I.e., computed on-board in real-time); how dynamic can they be?
- When should the Server versus the Client make separation & sequencing decisions?
- What are the impacts of emergencies on equipage and procedures?
- How can intersecting runways be used in "Virtual" VMC?
- How much of the visual segment of the approach can be presented in "virtual" computer graphics, versus actual out the window transition?

What else?

ATCA SATS.ppt: 3/2/00 Figure 12



SATSLab Demonstration SNI Scenario Design Questions





Simultaneous Non-Interfering Operations

- What mix of procedures and equipage will allow for SNI?
- Under what conditions will SNI Ops support intersecting runway, missed approach, and Land & Hold Short Operations?
- What are the impacts of emergencies on equipage and procedures?
- What approach and landing minima apply when using synthetic vision with Highway in the Sky (HITS) for SNI operations?
- What procedures and equipage will allow for transient corridors in Class B airspace for SNI Ops?



What else?

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SATSLab Demonstration EnRoute Scenario Design Questions







- What procedures and equipage will permit dynamic access through Special Use Airspace without voice communication?
- What limits in routing and altitude segments can be pilot-controlled?
- What are the impacts of emergencies on equipage and procedures?
- When should the Server versus the Client make separation & sequencing decisions?



What else?









SATS Agreement

SATS Program Description:

"The Small Aircraft Transportation System concept is a safe travel alternative that frees people and products from transportation system delays, creating access to more communities in less time."

Joint NASA-FAA supporting statements are:

- FAA and NASA are working together to define a SATS operational concept as it relates to the transportation infrastructure of the U.S. and will begin a NASA funded research initiative to explore the feasibility and viability of implementing that concept.
- ➤ Under the charter of the NASA/FAA Executive Committee, the agencies agree to form a working group to define the FAA-NASA engagement in SATS program development and implementation planning.

ATCA SATS.ppt: 3/2/00 Figure 15

